ASSOCIATION OF SOMATIC AND GERM CELLS IN CESTODES.

R. T. YOUNG.

The differentiated tissues of cestodes all arise from the parenchyma, primarily of the larva and secondarily of the adult. From this are formed the sex cells, there being no evidence whatever to indicate any specialized "germ path" or "germ cell determinants." One author[1] indeed has gone so far as to claim that specialized cells (muscle) may even be de- and redifferentiated to form germ cells.

How far these observations of Child are valid is open to question. His figures certainly give considerable support to his contention, but it is difficult to prove that any muscle directly contiguous to a developing testis is responsible for the origin of the latter, or that the testis represents its original myoblast. The contiguity may be accidental, and the parent muscle cell may lie at a different place and be separated from the muscle fibre by a considerable space, being connected to it by only a slender process. The occurrence of multinucleate myoblasts, some of which Child has figured and which I have occasionally found in my own slides, renders his interpretation reasonable, but by no means proves it.

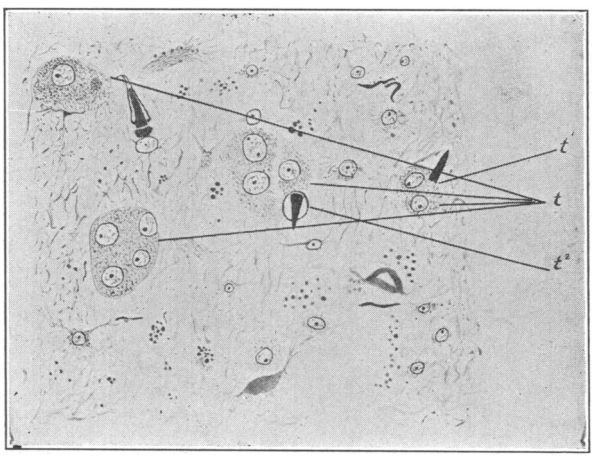
The occurrence of fully differentiated flame cells within the testis of several species[2] of cestodes, unconnected with any other flame cells or excretory capillaries is suggestive, although not proof of a common origin of these cells. It is quite possible that the flame cells may have arisen outside of the testis and migrated into the latter secondarily, or the testis and flame cell may have developed side by side, the latter becoming surrounded by the offspring of the former.

[1] Child, C. M., "Studies on the Relation between Amitosis and Mitosis, II., Development of the Testis and Spermatogenesis in *Moniezia*, BIOL. BULL., XII. 175–212.

[2] *Rhyncobothrium bulbifer*, *Dipylidium caninum* and an undetermined species from a woodpecker (*Dryobates*).

In the accompanying figure, however, I have shown what I consider good evidence in support of the former view.

This shows part of a proglottid of *Dipylidium caninum* containing numerous early testes. One of these contains but two cells, of which one is a developing flame cell (t') showing only the cone of cilia, while the other is a testis cell. Another shows



A part of the parenchyma of *Dipylidium caninum*, showing developing testes (t), two of which contain flame cells (t^1 and t^2), camera drawing. × 900.

several testis cells and one developed flame cell (t^2), which is not yet however connected with any capillary.

Obviously, I cannot prove that the groups containing t^1 and t^2 are developing testes. Their similarity of structure to neighboring testes is however sufficiently evident.

But whether or not these flame cells and the cells of the testes in which they lie are of common parentage, their occurrence within the testes is evidence of the simplicity of cestode development; for it shows that apparently any cell of one tissue (testis or parenchyma) may develop into a specialized cell of another tissue (flame cell) entirely apart from any other cells of the latter; the apparently determining factor being a stimulus of the physiological environment.

The question why two cells in close proximity to each other and probably of common descent, should develop on the one

hand into a flame cell, and on the other into a testis cell, cannot of course be answered in the present state of our knowledge. It is not unreasonable to suppose however that, as the result of some slight initial difference, one might become more susceptible to the presence of excreta in its environment and so develop into a flame cell; while the other, less susceptible to such influence, would follow its original course of development and become a testis cell.

There is in these cases evidently no continuity of development of the various parts of the excretory system as contended by Blochmann[1] and others, and discussed by me in an earlier paper.[2]

Such facts further clearly argue against the Roux-Weismann theory of mosaic inheritance, and in favor of Driesch's view that developing cells are totipotent, so far at least as cestodes are concerned.

[1] Blochmann, F., "Die Epithelfrage bei Cestoden und Trematoden," Hamburg, 1896.

[2] Young, R. T., "The Histogenesis of *Cysticercus pisiformis*," Zoöl. Jahrb., XXVI., 183–254.